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BULLETIN

OF THE

TORREY BOTANICAL CLUB

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Vol. 50 No. 6

BULLETIN

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TORREY BOTANICAL CLUB

JUNE, 1923

The antherozoid of the genus Riccardia

W. N. Steil

(WITH FIVE TEXT FIGURES)

A number of unsuccessful attempts were made to obtain the antherozoids of *Riccardia pinguis* (L.) S. F. Gray, which was found growing in a swamp in the vicinity of Madison, Wisconsin. Finally, on May 20, 1919, from a single male plant motile antherozoids were obtained. At this time, a number of preparations were made by first inverting a slide with a drop of water containing the free-swimming antherozoids over the fumes of a 1 per cent osmic acid solution. The preparation was then exposed to the air, and as soon as the water was evaporated, the slide was stained with a dilute gentian violet solution. By this method it was easy to stain the cilia and the different parts of the body of the antherozoid. Good preparations were also obtained with the acid-fuchsin and safranin combination.*.

The antherozoid of *Riccardia pinguis* (FIG. 1) is very large as compared with that of other liverworts. The accompanying drawing of the antherozoid of *Marchantia polymorpha* L. (FIG. 2), represented by the same magnification as the antherozoid of the *Riccardia*, shows the great difference in size between the antherozoids of the two species and also that the cilia are of equal length and attached to the same point of the body of the antherozoid.

* See Steil, Staining the antherozoid of the fern. Bot. Gaz. 65: 562. *f. 1.* 1918.

[The BULLETIN for May (50: 159–196. *pl. 8*) was issued May 25, 1923.]

The major portion of the body consists of a long rod-like homogeneous-staining nucleus extending to almost the posterior part of the body, where it gradually tapers to a point. The extreme posterior portion consists of a cytoplasmic structure which also tapers to a sharp point. This is the vesicle which usually becomes more densely stained than the remainder of the cytoplasmic portions. A cytoplasmic band or filament extends from the vesicle for some distance towards the anterior end where it becomes gradually narrower. It was difficult to determine its forward limit. A study of spermatogenesis already begun will, no doubt, aid in deciding this doubtful point.

FIG. 1. An antherozoid of *Riccardia pinguis* in the uncoiled condition, × 1527.

At the anterior end of the body are attached the cilia; one a short distance from the end, and the other some distance farther back. The cilia are of unequal length, the posterior one being considerably longer than the other. The fact that the cilia are attached at different points and are of unequal length is of interest, since in these two respects the antherozoids of *Riccardia pinguis* seem to be unique among the archegoniates.

The anterior end of the body of the antherozoid, extending forward from the point where the longer cilium is attached, stains less intensely with the gentain violet. It appears, therefore, that this portion is at least partially cytoplasmic. A darker staining portion at the point of attachment of each cilium can always be observed when the antherozoid is not over-

stained. Further studies of the development of the antherozoid will probably aid in determining the nature of the anterior portion of the antherozoid, including the blepharoplast, which at an early stage in spermatogenesis appears as a small spherical body.

FIG. 2. An antherozoid of *Marchantia polymorpha*, × 1527.

Although no detailed study has been made of the manner of swimming of the antherozoid, some observations may be worthy of mention. When the antherozoid moves from point to point, it is in the form of a funnel, the larger end of the funnel being at the anterior end (FIG. 3). The antherozoid is constantly rotating in the free swimming condition. Antherozoids were observed to remain motile for more than thirty minutes after they had been set free from the antheridia.

Many more male gametophytes of *Riccardia pinguis* were found in the vicinity of Madison in the spring of 1920, and from preparations obtained at this time the observations made the previous year were confirmed.

In the spring of 1921, a supply of male plants of *Riccardia pinguis* was obtained from Mr. Severin Rapp, of Sanford, Florida. Although there were some minor morphological differences between these male plants and those growing in this locality, the antherozoids of the two forms were exactly alike.

FIG. 3. An antherozoid of *Riccardia pinguis* in the free-swimming condition, × 1527.

For several years *Riccardia multifida* has been found growing on decaying wood in the same general region as *Riccardia pinguis*. Gemmae were produced abundantly by these plants, but antheridial branches were at no time discovered. Further observations could not be made on these plants since the species apparently disappeared from this locality where it was once found in abundance.

Both *Ricccrdia multifida* and *R. palmata* were, however, obtained from Mr. Rapp the past spring and some good preparations of the antherozoids of both species were obtained.

The antherozoid of *R. palmata* (Hedw.) Carruth. is almost as large as that of *R. pinguis*, although the body, as FIG. 4 shows, is much smaller in diameter. The cilia resemble those of the antherozoid of *R. pinguis*, being unequal in length and attached at different points. At the point of attachment of each cilium, there is an enlargement which becomes more intensely stained. The vesicle is somewhat rounded off and enlarged at the posterior end. There is present, approximately in the center of the vesicle, a very dense, nearly spherical body, which may also be readily observed in the living antherozoid.

FIG. 4. An antherozoid of *Riccardia palmata*, × 1527

The antherozoid of *Riccardia multifida* (L.) S. F. Gray (FIG. 5) is much smaller than that of either of the other two species described. The cilia are, however, similar as to differences in length and points of attachment. A large body is found at the base of each of the cilia. The vesicle resembles that of the antherozoid of *R. palmata*, but it contains two nearly spherical bodies of different sizes; one, the smaller and nearer to the posterior end of the nucleus is almost homogeneous, the other and larger body is always in contact with the first body and is usually somewhat granular. Since the origin of these bodies has not been studied during the course of development of the antherozoid in any of the *Riccardia* species, no further statement can at this time be made concerning them.

When the antherozoids of these two species are set free from the antheridia, they are closely coiled in the form of a flat disk. As the antherozoid uncoils, ready for swimming, the body

first forms a funnel but after a short interval takes on the form of a loosely coiled spiral. The peculiar funnel-like shaped of the body is characteristic, as has already been stated, of only the free swimming antherozoid of *Riccardia pinguis*. In this respect, the antherozoid of this species suggests that of the genus *Marsilia*.

Miss Clapp* studied the life history of *Riccardia pinguis* but made no detailed study of spermatogenesis. In her discussion, she states that her observations were confined to antherozoids which had not yet developed to maturity. No differences in length or points of attachment of the cilia were observed.

FIG. 5. An antherozoid of *Riccardia multifida*. × 1527.

On account of the peculiar development of the gemmae in some of the *Riccardia* species, such as *R. multifida*, it has been suggested that these liverworts might be traced to algal origin, probably to the Chlorophyceae. The nature of the cilia of the antherozoid suggests a possible heterokont relationship.

Although the antherozoids of only three species have been studied, it is very likely that these are typical for the genus *Riccardia*. A study of other members of the Jungermanniales may result in the discovery of antherozoids similar to those here reported.

The writer wishes to thank Dr. A. M. Showalter of the Department of Botany, University of Wisconsin, and Mr. Severin Rapp of Sanford, Florida, for assistance in obtaining material, and Dr. A. W. Evans and Miss Caroline Haynes for identifying some of the specimens.

MARQUETTE UNIVERSITY,
MILWAUKEE, WISCONSIN

* The life history of *Aneura pinguis*. Bot. Gaz. **54**: 177–193. *pl. 9–12*. 1912.

Two new composites from Florida

S. F. Blake

(with plate 9)

Lacinaria Ohlingerae Blake, sp. nov.

Perennial, 60–90 cm. high, the stem puberulous; leaves very numerous, linear, 1–2 mm. wide, punctate, glabrous; heads large, about 2.5 cm. high, about 25-flowered, turbinate, racemose or cymose-panicled; involucre 1.5–2 cm. high, the phyllaries rounded or the innermost obtuse, punctate, appressed, herbaceous with narrow, scarious, purplish, ciliolate margins; achenes densely pubescent, 7–9 mm. long; pappus bristles finely plumose under a lens.

Root tuberous-thickened, sometimes 3-lobed, 2.5–4.5 cm. long, about 1 cm. thick; stems 1–3 or more, slender, erect, 60–90 cm. high, rather densely incurved-puberulous, gland-dotted, simple or cymosely branched in the inflorescence, very leafy; leaves all narrowly linear, gradually decreasing in size above, 1–5.5 cm. long, 1–2 mm. wide, acute or acutish, callous-tipped, sessile, thick, 1-nerved, often twisted, densely punctate, glabrous; heads mostly 8 to 18, racemose on bracteolate pedicels 0.5–5 cm. long, or cymose-panicled on elongate erect 1 to 7-headed peduncles; involucre turbinate or in fruit turbinate-subglobose, about 7-seriate, graduate, 1.5–2 cm. high, the outermost phyllaries small, suborbicular, rather loose, the others oval or obovate to cuneate-oblong, 2–5 mm. wide, broadly rounded or the innermost obtuse, not mucronulate, appressed, all herbaceous, densely punctate, essentially glabrous dorsally, with narrow, scarious, usually purplish, ciliolate margins; disk 2.2–2.5 cm. high, 22–25-flowered; corollas rose-purple, 1.4–2 cm. long, sessile-glandular, the tube and throat slenderly trumpet-shaped, the teeth ovate, obtusish, 4-veined, 5.5 mm. long, 2.5 mm. wide (limb in flower 1–1.1 cm. wide); achenes narrowly obconic, 10-ribbed, 7–9 mm. long, densely and griseously spreading-pilosulous, gland-dotted between the ribs; pappus bristles numerous, 2-seriate, finely plumose, whitish, 1.5 cm. long; anther appendages very small.

TYPE in the U. S. National Herbarium, No. 1,116,795, collected in scrub formation nine miles southeast of Frostproof, Polk County, Florida, November 1, 1922, by Mrs. F. E. Ohlinger. Duplicates in the Gray Herbarium and the herbarium of the New York Botanical Garden.

Ample material of this beautiful plant has been received through Mr. F. L. Lewton from the collector, Mrs. F. E. Ohlinger of Frostproof, Florida. The species is nearest *L. scariosa* (L.) Hill, but differs markedly in its uniformly very narrowly linear leaves, as well as in its larger heads and much larger corollas and achenes. The nodding of some of the heads shown in the plate, which is drawn from a photograph of the type specimen, is undoubtedly due to the fact that the stem was bent backwards in growth. The narrowly linear obtusish style branches are 11 mm. long, the decidedly unequal stigmatic lines only about 4 mm. long. The minutely emarginate anther tips are about 0.2 mm. long.

Flaveria pinetorum Blake, sp. nov.

Glabrous perennial; leaves narrowly linear, 3–7.8 cm. long, 0.5–2 mm. wide; panicle small, dense, essentially naked; phyllaries 5; receptacle naked; ♀ flowers 0–1, ☿ 9–12; disk corollas about 3 mm. long, subglandular-puberulous; achenes equal, 1–1.4 mm. long.

Slender perennial, the root short, about 5 mm. thick, the stems few or solitary, ascending or erectish, sometimes decumbent and rooting below, 20–40 cm. long, simple below the inflorescence, glabrous except for the puberulous inflorescence; lower internodes 2–13 mm. long, the middle and upper 3–6 cm. long; leaves opposite, connate at base, narrowly linear or very narrowly oblanceolate-linear, 3–7.8 cm. long, 0.5–2 mm. wide, acutish, entire or obscurely denticulate above, fleshy, 1-nerved, erect or the lower usually reflexed; heads rather numerous, 4 mm. high, in a small ternately divided cymose panicle 1.5–5.5 cm. wide, the bracts linear-subulate, 7 mm. long or less, the pedicels about 1 mm. long or less; phyllaries 5, sometimes with 1–3 small bractlets at base, equal, oval-oblong, 4 mm. long, obtuse or rounded, carinate, about 6-nerved, glabrous; receptacle small, flattish, naked; ligule usually 0, sometimes 1, yellow, the tube 1 mm. long, the lamina obovate-elliptic, subentire, 6-veined,

reflexed, 3 mm. long, 1 mm. wide; disk corollas 9–12, yellow, puberulous with subglandular hairs, 2.8–3.2 mm. long (tube 1–1.2 mm. long, throat cylindric below, funnelform-campanulate above, 1.5 mm. long, teeth 5 or sometimes 4, ovate, 0.5 mm. long); achenes all alike, blackish, glabrous, 1–1.4 mm. long.

TYPE in the U. S. National Herbarium, No. 1,028,688, collected in moist pineland, vicinity of Fort Myers, Lee County, Florida, December 14, 1919, by Paul C. Standley (No. 18909).

ADDITIONAL SPECIMEN EXAMINED:—

FLORIDA: Low pinelands, Alva, Lee County, Nov. 25, 1917, *Mary E. Francis 156*.

The nearest relative of this species, both geographically and systematically, is *Flaveria floridana* J. R. Johnston, a stout annual 5–10 dm. high, with broader leaves, leafy-bracted inflorescence, and glabrous disk-corollas. The only other species which might be confused with it, *F. linearis* Lag., which also occurs in Florida, is taller and has only "2"–7 disk flowers.

Another plant, *Standley 12859*, from the type locality, may be referable to this species, but is decidedly abnormal. The stout stem is woody, with grayish exfoliating bark. The late heads are about 18-flowered, and bear 6 or 7 pales, similar to the phyllaries, on the outer edge of the receptacle inside the outermost series of flowers.

Explanation of plate 8

LACINARIA OHLINGERAE Blake

FIG. *a*. Type, about ½ natural size.
FIG. *b*. Corolla, about natural size.
FIG. *c*. Corolla lobes, about × 2.
FIG. *d*. Achene, about natural size.
FIG. *e*. Portion of pappus bristle, about × 10.
FIG. *f*. Stamens, about × 8.

LACINARIA OHLINGERAE BLAKE

The taxonomic and morphologic status of Ophioglossum Alleni Lesquereux

ARTHUR HOLLICK

(WITH PLATES 10–12)

About fifty years ago Lesquereux described, without any accompanying illustration, an imperfect fossil plant specimen from the Miocene Tertiary shales of Florissant, Colorado, under the name *Ophioglossum Alleni.** The description was as follows:

> Leaf, elliptical, narrowed by a curve to the acute base; shorter and broader than in *O. vulgatum* L., of our time, with the same areolation.
>
> The leaf is about 3 cent. long (point broken), a little more than 2 cent. broad, marked in the middle by the remnant of a fruiting pedicel . . .

Subsequently the same author redescribed and figured the specimen under the name *Salvinia Alleni*,† and remarked: "By its form, its areolation, its size, all its characters, indeed, it is remarkably similar to *Salvinia reticulata* Heer."‡ His amended description was as follows:

> Leaves oval, rounded in narrowing to the base; lateral veins, none visible, areolae large, irregularly square or equilateral, inordinately distributed.
>
> Leaf about three and a half centimeters long, twenty-two millimeters broad, of a thin substance, with a thick middle nerve and irregularly quadrate meshes, formed of very distinct black nervilles, the primary ones more or less in right angle to the middle nerve, with oblique, generally parallel veinlets between them . . . .

Later he listed and figured two other, more perfect specimens,§ with the following brief comment:

> The species is common and has been obtained in large well-preserved specimens by the different collectors. The leaves are merely variable in size, obtuse or slightly emarginate at the apex, topped by the point of the excurrent nerve.

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* U. S. Geol. Survey Terr., Sixth Ann. Rept. 1872: 371. 1873.

† U. S. Geol. Survey Terr. Rept. vol. 7 (The Tertiary Flora): 65. *pl. 5, f. 11.* 1878. Reproduced on PLATE 10, FIG. 1.

‡ Flora Tertiaria Helvetiae 3: 156. *pl. 145, f. 16.* 1859. Reproduced on PLATE 10, FIG. 4.

§ U. S. Geol. Survey Terr. Rept. vol. 8 (The Cretaceous and Tertiary Floras): 136. *pl. 21, f. 10, 11.* 1883. Reproduced on PLATE 10, FIGS. 2, 3.

In 1894 I had occasion to examine the figures and descriptions of this and other fossil species described under, or referred to, the genus *Salvinia*, and in a paper on the subject I referred Lesquereux' species to the genus *Tmesipteris** and incidentally compared it with *Salvinia reticulata* (Ettingshausen) Heer, above mentioned, which Heer had suggested was, apparently, specifically identical with a fragmentary leaf or pod originally described by Ettingshausen under the genus *Dalbergia*;† but the resemblance to a pod did not impress me at the time.

In 1913, Professor T. D. A. Cockerell,‡ in a discussion of the fauna and flora of the shales in which the species was originally discovered and from which the specimens subsequently collected were obtained, remarked:

> The so-called *Tmesipteris alleni* (Lx.) Hollick, although common, can not be referred to any genus known to those who have examined it. It has nothing whatever to do with *Tmesipteris*, nor does it belong to *Salvinia* or *Ophioglossum*, as placed by Lesquereux. It may be known for the present as *Carpolithes alleni* (Lx.).

Thus it was given its fourth generic appellation—one that suggested similarity in appearance to a carpel or capsule or pod-like organism of some kind.

In 1919 Florin,§ in a paper on fossil Salvinias, expressed an opinion similar to that expressed by Cockerell—to the effect that the taxonomic status of Lesquereux' species was too uncertain to warrant its reference to any well-defined genus—and relegated it to the comprehensive fossil genus *Phyllites*, under the name *P. alleni* (Lesquereux) Florin (loc. cit. p. 254). The fifth generic name was thus applied in connection with the species—a name, apparently, meant to indicate that the author intended to suggest that it probably represented a foliar organ.

---

* Fossil Salvinias, including description of a new species. Bull. Torrey Club **21**: 253–257. *pl. 205*. 1894.

† *Dalbergia reticulata* Ettingshausen, Beitrag zur Kenntniss der Fossilen Flora von Tokay. Sitzb. K. Akad. Wiss. [Wien.] Math.-Naturwiss. Cl. **11**[1]: 813. *pl. 4, f. 5*. 1853. Reproduced on PLATE 10. FIG. 5.

‡ The Fauna of the Florissant (Colorado) Shales. Am. Jour. Sci. **36**: 498–500. 1913.

§ Eine Uebersicht der Fossilen *Salvinia*-Arten, mit besonderer Berücksichtigung eines Fundes von *Salvinia Formosa* Heer in Tertiär Japans. Bull. Geol. Inst. Upsala **16**: 249–260. *pl. 11*. 1919.

Recently Professor Cockerell* called attention to the fact that, in connection with certain specimens of the species, there could be detected a peculiar protuberance or body, apparently attached to the midrib, near the middle, in regard to one of which he remarked (loc. cit. pp. 211–212):

> It looks like a small berry, with the contents extruded. . . Probablythe riddle would never have been solved but for the discovery of a younger specimen . . . This . . . shows that we have to do neither with a leaf, frond nor pod, but with a cladode. Attached to the midrib is an indistinct mass, presumably a thin bract, upon which can be seen a dark object . . . which seems to agree very closely with the flower of *Ruscus* . . . The genus Ruscus [has] . . . lanceolate to ovate sharply pointed cladodes . . . . At first sight the venation seems quite different from that of the fossil, *but if we imagine the Ruscus cladode broadened and abbreviated until the principal veins are nearly or quite transverse instead of longitudinal, the correspondence is exact.*†

Based upon this course of reasoning a new genus was evolved, and Lesquereux' multi-generic species became *Brachyruscus Alleni* (Lesquereux) Cockerell (loc. cit. p. 212)—the sixth binomial under which it was described and discussed. Incidentally it may also be noted that this last change of name definitely transferred the species from the Pteridophyta to the Spermatophyta and changed it from a frond, a leaf, or a fruit to a cladode. The question whether or not this last change of name should be accepted as the final word in regard to its probable taxonomic and morphologic status did not, however, appear to be answered conclusively or satisfactorily, based as it was on a frank appeal to the imagination to supply the necessary evidence. Also the naïvely worded footnote on page 212 appeared to be more or less of the nature of a challenge. In any event the statements and conclusions set forth in the paper certainly called for a critical examination of all of the available facts and their faithful presentation, without any attempt to connect them with any preconceived theory and without any appeal to the imagination to supply any features in the specimens that might be poorly preserved or lacking.

During a recent visit to the United States National Museum I was enabled to examine some fifty specimens of the species in

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* A new genus of fossil Liliaceae. Bull. Torrey Club **49**: 211–213. *f. 1.* 1922.

† The italicising is mine.

question, all of them from the type locality at Florissant, Colorado. Among these I had no difficulty in finding a dozen or more that showed, either distinctly or indistinctly, the presence of some kind of a body, as described by Professor Cockerell. Nine were selected for illustrating the critical characters, all of which were photographed and are reproduced, natural size, on PLATE 10, FIGS. 6–11, and on PLATE 11, FIGS. 1–3; and the latter three were also enlarged so as to show the characters more clearly. The three enlargments are reproduced on PLATE 11, FIGS. 1a–3a. The salient characters that they may be seen to reveal are: (1) a system of reticulate nervation, with the nerves of uniform rank throughout; and (2) either an indistinct thickening or a well defined, flattened spheroidal body (occasionally two), located toward the middle of the foliaceous organ.

The general appearance of the specimens, however, strongly suggests that they represent a flattened pod, or a detached carpel of a pod, rather than a foliaceous organ, to which are attached either immature, or imperfect, or mature and perfect seeds. In certain of the specimens, as in those represented on PLATE 11, FIGS. 1, 1a, and 3, 3a, the seedlike bodies are apparently in the superior position and are impressed on the exposed surface of the specimens. In others, as represented on PLATE 11, FIGS. 2, 2a, they appear to occupy the inferior position and are more or less masked by the overlying tissue. The superior position is also indicated in the specimens depicted on PLATE 10, FIGS. 10, 11, and the inferior position in FIGS. 6–9 on the same plate. The latter figures also appear to represent more or less immature or imperfect specimens; and in the specimen represented by FIG. 8 the overlying tissue near the middle was carefully chipped away from what appeared to be some kind of a body beneath, but nothing was revealed except some obscurely defined ridge and furrow markings that appear to represent a slight thickening or expansion of the median nerve or rib.

On PLATE 12, FIG. 1, is shown a pressed capsule of *Staphylea trifolia* Linnaeus, and in FIG. 2 the exterior of a detached carpel of *Koelreuteria bipinnata* Franchet. In each may be seen the surface inequalities due to the underlying seeds. FIG. 3 represents the exterior of a carpel of *Koelreuteria paniculata* Laxman; FIG. 4, the interior with seeds attached to the alate expansion

of the midrib; FIG. 5, the latter flattened by pressure; FIG. 6, the same with seeds detached. FIG. 7 is a reproduction of Cockerell's figures illustrating his description of *Brachyruscus*, and FIG. 8, a drawing of a cladode of *Ruscus aculeatus* Linnaeus, with infloresence attached. A comparison between the last two figures hardly seems to suggest, even with the assistance of an earnest effort of the imagination, that there could be any near relationship between the specimens that they represent; and, in any event, it is evident that, if the description and figures of *Brachyruscus* correctly describe and depict the specimen selected by the author as the type of the genus, *Brachyruscus Alleni* Cockerell can not possibly be either congeneric or morphologically identical with *Ophioglossum Alleni* Lesquereux. The author has, however, provided for this contingency to a certain extent, in the footnote previously mentioned, which should be read in this connection.

Incidentally, on PLATE 12, FIG. 9, is a drawing of a bract of *Dobinia vulgaris* Hamilton, showing the character of the nervation and a fructification attached to the midvein, in order that it may perhaps be recognized and accepted, in preference to the cladode of *Ruscus*, as the morophological equivalent and a possible family relative of *Brachyruscus*.

In view of the facts here presented if anyone should deem it necessary to coin a seventh generic name for *Ophioglossum Alleni*, based upon its resemblance to capsules or carpels of species of certain genera included in the Staphyleaceae and Sapindaceae, the responsibility will rest on him, not on me. The already established name, which is descriptive of what the species appears to morphologically simulate and which is therefore properly applicable, is *Carpolithes Alleni* (Lesquereux) Cockerell.

Explanation of plates 10–12

PLATE 10

SALVINIA ALLENI (Lesquereux) Lesquereux
[= *Ophioglossum Alleni* Lesquereux]

FIG. 1. U. S. Geol. Survey Terr. Rept. Vol. 7 (The Tertiary Flora): *pl. 5, f. 11.* 1878.

FIG. 2. Idem. Vol. 8 (The Cretaceous and Tertiary Floras): *pl. 21, f. 10.* 1883.

FIG. 3. Idem. *f. 11.*

SALVINIA RETICULATA (Ettinghausen) Heer

FIG. 4. Flora Tertiaria Helvetiae **3**: *pl. 145, f. 16.* 1859.

DALBERGIA RETICULATA Ettinghausen

FIG. 5. Sitzb. K. Akad. Wiss. [Wien] Math.-Naturwiss. Cl. **11**[4]: *pl. 4, f. 5.* 1853.

SALVINIA ALLENI (Lesquereux) Lesquereux

Reproductions of photographs, natural size, of specimens from the type locality at Florissant, Colorado.

FIG. 6. Showing indications of immature or imperfectly developed fructification. U. S. Nat. Mus. No. 36693.

FIG. 7. Idem. U. S. Nat. Mus. No. 36690.

FIG. 8. Idem., with overlying tissue removed. U. S. Nat. Mus. No. 36692.

FIG. 9. Showing indications of more maturely developed fructification. U. S. Nat. Mus. No. 36694.

FIG. 10. Showing mature fructification. U. S. Nat. Mus. No. 36691.

FIG. 11. Idem. U. S. Nat. Mus. No. 36688.

PLATE 11

SALVINIA ALLENI (Lesquereux) Lesquereux

Reproductions of photographs of specimens from the type locality at Florissant, Colorado, showing mature fructifications.

FIG. 1. Natural size. U. S. Nat. Mus. No. 36695.

FIG. 1a. Same specimen, × 2.

FIG. 2. Natural size, U. S. Nat. Mus. No. 36689.

FIG. 2a. Same specimen, × 2.

FIG. 3. Natural size. U. S. Nat. Mus. No. 50277.

Fig. 3a. Same specimen, × 2.

PLATE 12

STAPHYLEA TRIFOLIA Linnaeus

FIG. 1. Capsule, natural size, compressed, showing inequalities due to included seeds; distal end upward. From a specimen in the herbarium of the New York Botanical Garden, collected at Knoxville, Tennessee, in April, 1878, by Albert Ruth, No. 358.

KOELREUTERIA BIPINNATA Franchet

FIG. 2. Carpel, natural size, compressed, showing outer surface with inequalities due to included seed; distal end downward. From a specimen in the herbarium of the New York Botanical Garden, collected in Central China, 1885–88, by Angust Henry, No. 7591.

KOELREUTERIA PANICULATA Laxman

Carpel, natural size, under varied conditions; distal ends downward From a tree in the grounds of the U. S. Department of Agriculture, Washington. D. C., collected in August, 1922, by Arthur Hollick.

FIG. 3. Outer surface.

FIG. 4. Inner surface, with seeds attached to a late expansion of the midrib.

FIG. 5. Same, flattened by pressure.

FIG. 6. Same, with seeds detached.

BRACHYRUSCUS ALLENI (Lesquereux) Cockerell

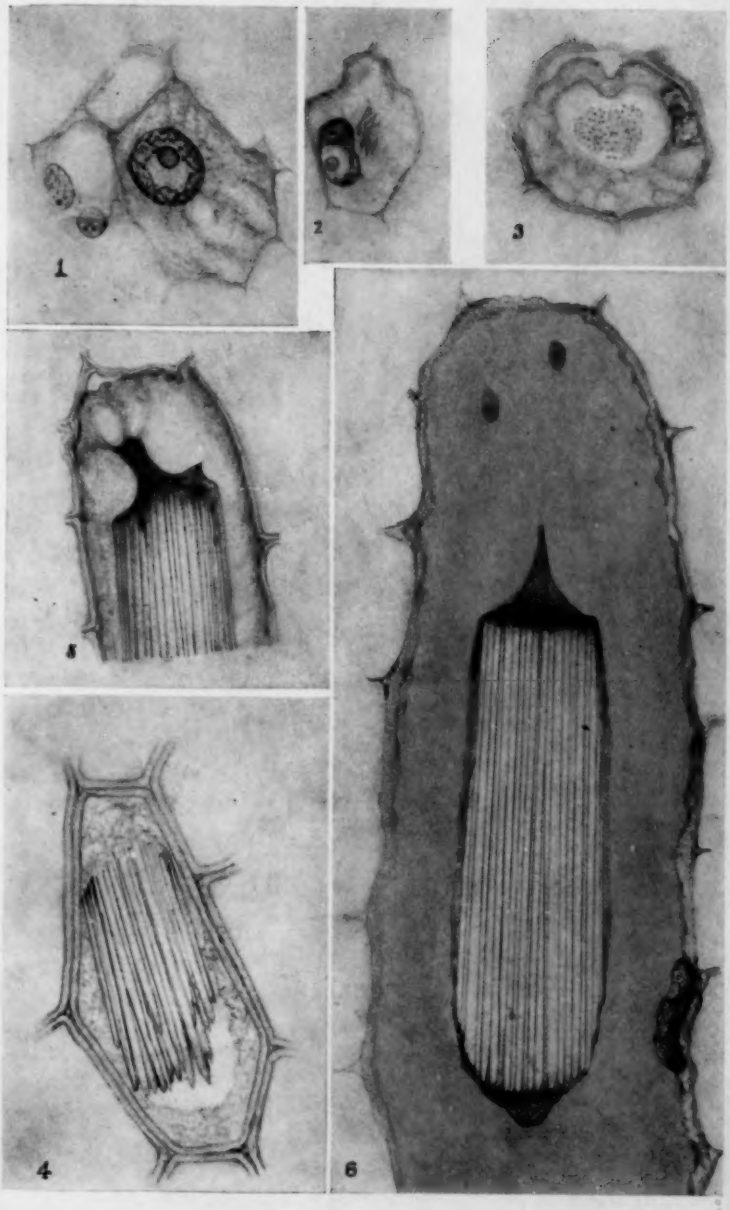
FIG. 7. Bull. Torrey Club **49**: *f. 13, A-D.* 1922.

RUSCUS ACULEATUS Linnaeus

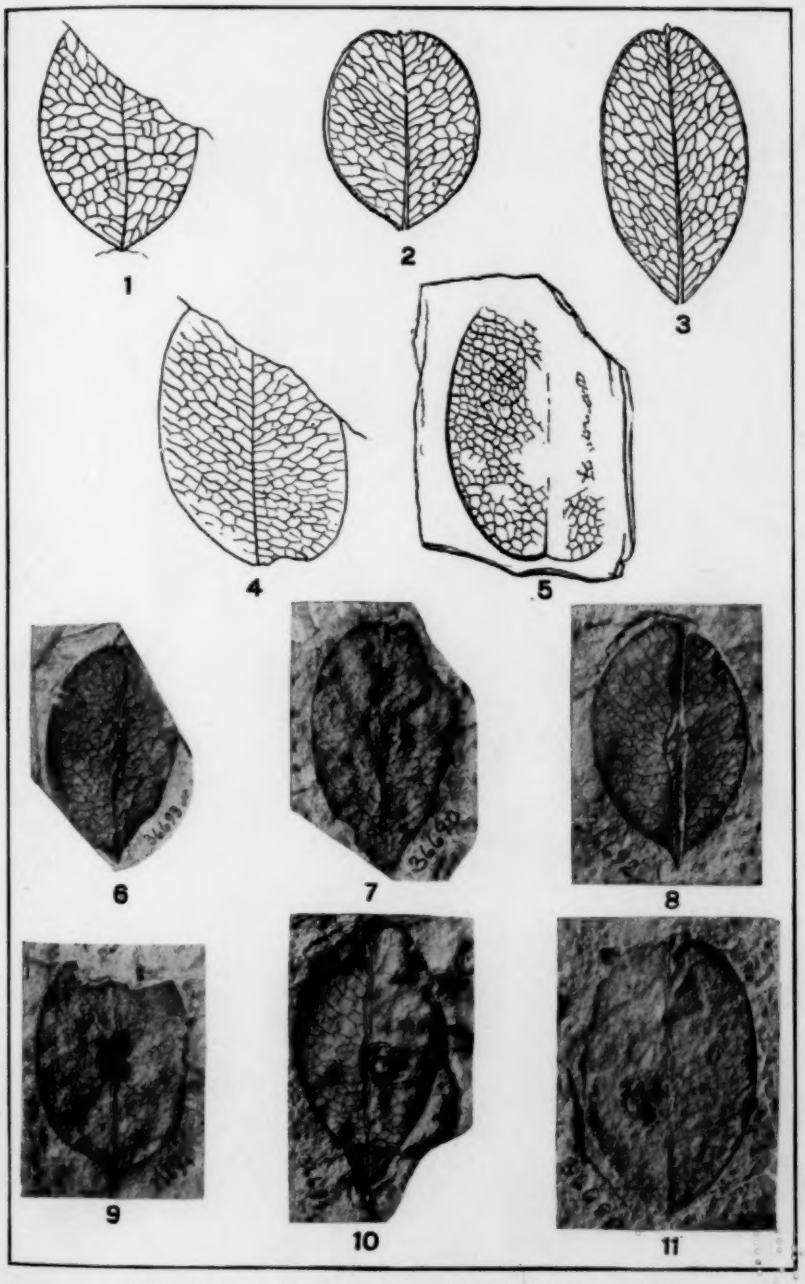
FIG. 8. Cladode, natural size, upper surface, showing inflorescence attached to the median nerve; distal end upward. From a cultivated specimen in the herbarium of the New York Botanical Garden, collected at Montpellier, France.

DOBINEA VULGARIS Hamilton

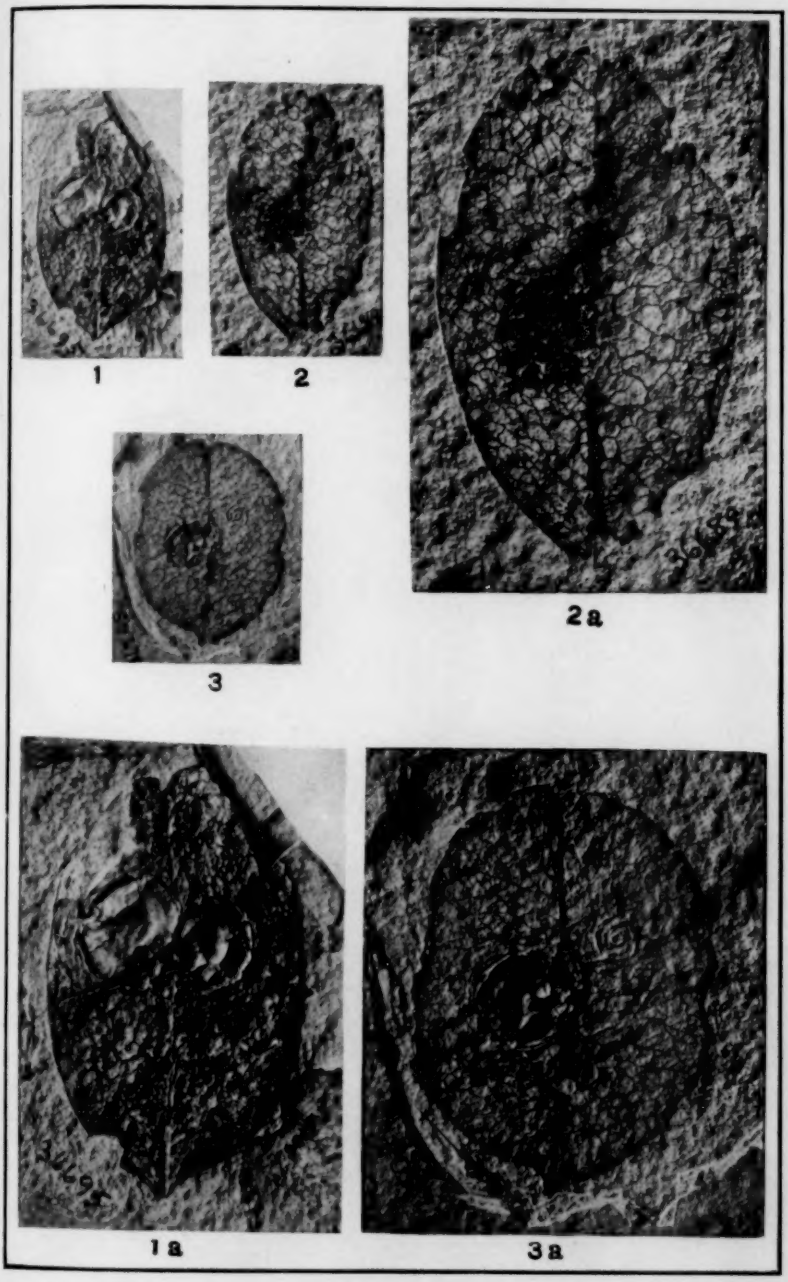
FIG. 9. Bract, natural size, upper surface, showing fructification; distal end upward. From a specimen in the herbarium of the New York Botanical Garden, collected in Nepal, India, probably in 1821, by Nathaniel Wallich.



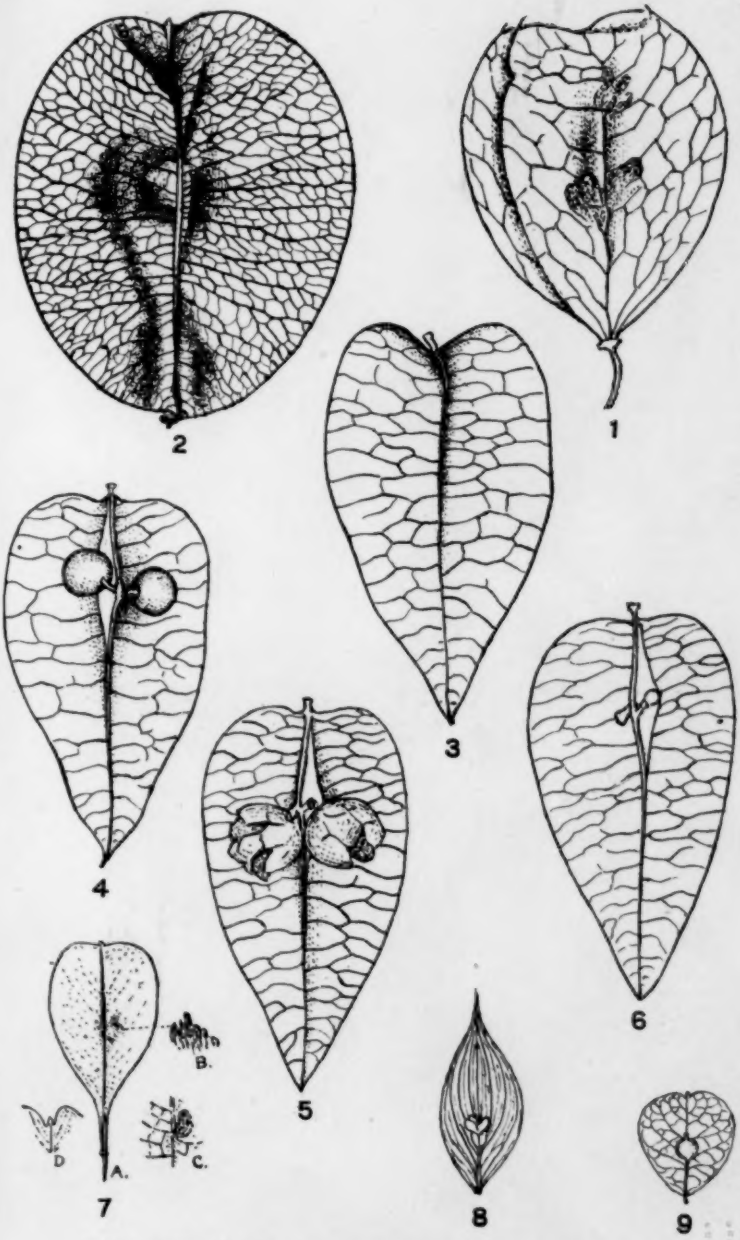
SMITH: HISTOLOGY OF ORCHIDS



HOLLICK: STATUS OF OPHIOGLOSSUM ALLENI



HOLLICK: STATUS OF OPHIOGLOSSUM ALLENI



HOLLICK: STATUS OF OPHIOGLOSSUM ALLENI

A note on Penstemon Stephensi

T. S. Brandegee

The reduction of *Penstemon Stephensi* Brandegee to a variety of *P. Clevelandi* Gray has recently been made*, with the mention of a few points of difference and the neglect of an important character, the color of the flowers. *P. Stephensi* is a purple-flowered and *P. Clevelandi* a scarlet-flowered penstemon. Having seen both species alive and growing, I am certain that they have very differently colored flowers and that *P. Stephensi* with its light purple corolla can not represent a color-form of the scarlet *P. Clevelandi*. When a scarlet-flowered species assumes a color-form the flowers become yellow. Some fine specimens of the scarlet-flowered *P. centhranthifolius* Benth., with yellow flowers, grow along the road between Coalinga and Paso Robles, California.

* See Munz & Johnston, Bull. Torrey Club **49**: 41. 1922.

Two new plants from Colorado

GEO. E. OSTERHOUT

Draba alpicola sp. nov.

A small many-stemmed, perennial, alpine *Draba*; the root-stock much branched, the stems 2–4 cm. high, hispidly pubescent, very slender, carrying one or two leaves, these 5–8 mm. long, scant 2 mm. wide, sessile by a narrow base; root leaves many, oblanceolate, or narrowly spatulate, widest near the top, 1.5 cm. long, about 2 mm. wide near the top, hispid ciliate on the edges, a few similar hairs on the surfaces but no fine pubescence; the inflorescence congested at the ends of the stems, consisting of three to six flowers on pedicels 2–4 mm. long; the sepals ovate, hispid, 2 mm. long, 1 mm. wide; the petals white nearly 4 mm. long, 2 mm. wide at the top, narrowed to a claw; the silique 3–4 mm. long, 2 mm. wide; the style 1 mm. long.

The only specimens I have of this *Draba* were collected July 22, 1903, No. 2842, on the mountains of Estes Park, Larimer County, on the range beyond "Windy Gulch." From the fact that it had a moss clinging about the roots it is very likely that it grew in the shade and shelter of rocks, probably on the western rim of the mountain, where it slopes toward the canyon of the Thompson River. A portion of the type specimen is in the herbarium of the University of Wyoming.

Oreocarya stricta sp. nov.

Perennial, the stem usually single though occasionally two or three from a tap-root, with a cluster of oblanceolate leaves 2–3 cm. long and 1.5–2.5 mm. wide, at the base; the stem 1.5–2.5 dm. long, strict and upright, without branches, hispid with squarrose translucent hairs 2 mm. long, leafy, the leaves alternate, oblanceolate, similar to the basal ones, all of them hispid with coarse hairs and a finer pubescence beneath; the upper third of the stem bearing the racemose inflorescence, the peduncles very short, the upper of two to four flowers and about 1 cm. long, more crowded at the top of the stem; the calyx 4–5 mm. long, becoming 6–8 mm. long in fruit, the lobes narrowly lanceolate, with a midrib, hispid like the leaves; the corolla the length

of the calyx, white with a yellow eye (?), the tube and the limb about equal; nutlets four, margined, narrowly ovate or elliptical, rugose on the back, 3.5 mm. long, about 2 mm. wide.

This is a rather slender and upright *Oreocarya*, with a cluster of leaves at the base. In the dried specimens the corolla appears to have a yellow eye. The nutlets are wrinkled somewhat like those of *O. virgata* (Porter) Greene, but the two plants, in other ways, have almost no similarity. It was collected June 21, 1922, No. 6195, on a stony hill, some distance south of the Yampa or Bear River, in Moffat County, along the "Victory Highway." The country is dry, broken, and desert-like.

WINDSOR, COLORADO

INDEX TO AMERICAN BOTANICAL LITERATURE
1920-1922

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in the broadest sense.

Reviews, and papers that relate exclusively to foresty, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

This Index is reprinted monthly on cards, and furnished in this form to subscribers at the rate of three cents for each card. Selections of cards are not permitted; each subscriber must take all cards published during the term of his subscription. Correspondence relating to the card issue should be addressed to the Treasurer of the Torrey Botanical Club.

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New genus of uncertain fatherland.

Rose, J. N. *Echinocereus Baileyi.* Addisonia **7**: 41. *pl. 245.* 4 D 1922.

Rose, J. N. *Graptopetalum pachyphyllum.* Addisonia **7**: 45. *pl. 247.* 4 D 1922.

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Rose, J. N. *Runyonia longiflora.* Addisonia **7**: 39, 40. *pl. 244.* 4 D 1922.

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